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(54) **Creatine beverage and producing process thereof**

Kreatineenthaltendes Getränk und Verfahren zur Herstellung desselben

Boisson contenant de la créatine; procédé de préparation

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Description

[0001] The present invention relates to a healthy, an energetic or a nutritious beverage containing creatine as a main ingredient and a process for producing a creatine beverage.

Description of the prior art

[0002] The demand of bottled or canned beverages has been rapidly increasing with the spread of vending machines. Further, water pollution has promoted extension of the kinds of these beverages from conventional carbonized drink and fruit juice to mineral water, natural water and healthy or nutritious drinks. Above all, healthy drinks are expected to enjoy demand as new popular merchandise depending of the choice and effects of the ingredients.

[0003] Whether such demand is met depends on the choice of an active ingredient and the preparation for enhancing the effect of the active ingredient. The beverages to be sold in quantities on the vending machines should be produced at low cost. Further, the ingredients should have stable quality during delivery.

[0004] On the other hand, the International Olympic Committee (IOC) prohibits players from taking drugs habitually to increase their physical ability artificially. The list of the drugs prohibited by IOC covers more than 120 kinds. Creatine is one of the amino acids biosythesized in vertebrates. Ninety-five to ninety-eight % of the creatine in a body is present in muscles, serving to accelerate rapid energy transport in the muscular cells. A high creatine content in skeletal muscles is important for continuation of exercise and postpones the time at which the muscles are felt fatigued. Similarly, the creatine in heart muscles acts to prevent myocardial fatigue in any situation that imposes stress on the heart. The creatine is not included in the list of the drugs prohibited by IOC. In the Barcelona Olympics, much attention was focussed on the result that two of the English track and field players who took the creatine won the championship, one in the men's 100-meter final and the other in the women's 400-meter final.

[0005] Since the creatine is present in muscles (about 4 gram per K-gram of fresh muscles), a human body can be supplied with the creatine by meat intake. However, it is costly to take a large quantity of the meat for assuring a requisite supply of the creatine. Besides, the creatine content of the meat tends to decrease with a time during storage of the meat or a heating on cooking. Therefore, in a case where the muscles should be developed in a short time as demanded by athletics, it has been a practice to take a creatine solution prepared by dissolving a creatine tablet or powder weighing 1 to 3 gram in moderately warmed water by stirring within 10 minutes from the preparation twice a day. However, since the creatine in a neutral aqueous solution turns creatinine, which has no function in muscular cells and is excreted in the urine, a creatine aqueous solution does not keep long and will lose its effect unless taken immediately after the preparation.

[0006] WO 94/02127 discloses compositions comprising creatine for increasing muscular strength. The compositions may be prepared by dissolving creatine in warm or hot water. There is no disclosure in D1 that the water has to be rendered weakly alkaline.

SUMMARY OF THE INVENTION

[0007] The present invention has been completed in the light of the above-mentioned circumstances. An object of the present invention is to provide a healthy beverage comprising creatine as a main ingredient which does not lose the effect of creatine during preservation and which can be prepared at low cost. Another object of the present invention is to provide a process for producing a creatine beverage which is stable state not to charge into creatinine and could be effectively to utilize to a healthy, an energetic or a nutritious beverage.

[0008] According to one aspect of the present invention, for achieving the objects described above, there is provided a creatine beverage which is produced by the steps of:

heating water rendered weakly alkaline; adding from 1 to 3 gram per 100 cm^3 of the heated water, of crystalline creatine powder to the heated water; dissolving the creatine powder by stirring to form a creatine aqueous solution; and adding an additive for improving nutrition or palatability to the creatine aqueous solution to creatine drink through a sterilization treatment.

[0009] According to another aspect of the present invention, there is provided a process for producing a creatine beverage comprising the steps of; heating water rendered weakly alkaline; adding from 1 to 3 gram per 100 cm^3 of the heated water, of crystalline creatine powder to the heated water; dissolving the creatine powder by stirring to form a creatine aqueous solution; adding an additive for improving nutrition or palatability to the creatine aqueous solution to obtain a creatine beverage through a sterilization treatment.

[0010] The nature, principle and utility of the invention will become more apparent from the following detailed description when read in conjunction with the accompanying drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

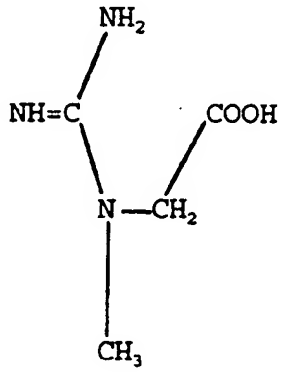
[0011] Creatine (N-(Aminoiminomethyl)-N-methylglycine; N-amidinosarcosine; (α-methylguanido)acetic acid; N-methyl-N-guanylglycine; methylglycocyamine) has a monoclinic crystal form containing one molecule of crystal water and releases the water molecule at 100°C to become an anhydrous acid. The creatine in an aqueous solution gradually decomposes with a time to the creatinine under a neutral to acidic condition.

Because such decomposition does not take place under an alkaline condition, the creatine in an alkaline aqueous solution can be preserved without losing its effect.

[0012] Larger supply of the creatine by food intake than the upper limit absorbable in muscles is of no use. On the other hand, too small supply produces little effect of replenishment. In the present invention, it was decided based on the results of study published to date that the creatine content per container for a single dose falls within a range of from 1.0 to 4.5 gram so as to increase the absorption in the body while avoiding waste of the ingredient and making cost reduction possible. Various additives are to assist activation of the muscles as nutrition sources or to improve the palatability of the beverage.

[0013] The most remarkable part of characteristics of the creatine is a transition from the creatine to the creatine phosphate by enzyme named creatine kinase. The creatine of the percentage from 60 to 90 % is distributed as the creatine phosphate at a rest. How much PCr (creatine phosphate) is held at a rest depends on how fast (nearly at once) resynthesis of ATP (adenosinetriphosphate) is stored at a contractive exercise of the muscle. The resynthesis power of the ATP holds the key to a continuous exercise, and how much storage of ADP (adenosine diphosphate) that causes outflow of free radical facilitating the cell wall destruction by the contractive exercise of the muscle is put down depends on the PCr quantity in the rest. The PCr can be resynthesized from other ATP by fat and carbohydrate oxidation reaction at an intracellular glomerular. The creatine and the PCr assist in carrying energy produced at the intracellular glomerular to the different area to be able to use. The more PCr quantity is much, the more resynthesis is fast, and the contractive fiber holds quantity of the ATP at a high rate (ADP is little quantity). However, when the resynthesis power by the PCr with the progress of the exciting exercise begins to occur the limit, the ADP quantity gradually increase, disburb and begin to see the weakness of the muscle (fatigue). The PCr is a high quantity before starting work by supply of the creatine (resynthesis power is high) and if there are a lot of all quantity of the creatine (a state being able to carry amply an anergy), staminas increase and recovery power comes to high. Increase of the PCr quantity by supply of the creatine have working that put down occurrence of acidosis by lactic acid produced at the exciting exercise. Diminish of ATP's excretion to urea acid with increase of the PCr quantity obstract outflow of free radical and put down fatigue of the muscle after the exciting exercise.

[0014] The process for producing the creatine beverage of the present invention will be explained in greater detail with reference to specific examples. Starting creatine is crystals of a monohydrate of the compound having structural formula shown in the below chemical formula 1. Chemical products, such as "Ergomax C150 (Trademark)", produced by AMS Co. of Yorkshire in England, may be utilized. The products "Ergomax C150" are tablets of solid and the creatine is not dissolved in water. Therefore, in a case of using the products "Ergomax C150", it is necessary to dissolve it in hot water and then drink the dissolved solution. If the tablet ("Ergomax C150") is directly drunk, the creatine in the tablet is changed into the creatinine due to strong acid in a stomach. Therefore, it is impossible to drink the table ("Ergomax C150") at it is.



Chemical formula 1

[0015] A batch of pure water or distilled water is put in a container, adjusted to a prescribed "pH" between pH 7 and Ph 10 with a normal alkali solution, and heated to a temperature of 20 to 99°C. To 100 parts by weight of the warm water is added 1 to 3 parts by weight of the creatine and dissolved by stirring. The "pH" is not particularly limited as long as it is alkaline, but is desirably not higher than pH 9 taking the physiological influences on eye balls and gastrointestinal tracts into the consideration.

[0016] To the thus prepared creatine aqueous solution are added appropriately fruit sugar, amino acid, mineral, such as calcium and magnesium, and vitamin for improvement of palatability and for supplement of nutrition to obtain a creatine drink. In order to remove bacteria having entered during the preparation thereby to prevent denaturation during storage, the resulting creatine drink is sterilized by passing through a bacterial filter having an opening of 0.2μm diameter or less. The bacterial filter may be substituted for heating the resulting creatine drink at a temperature of 60 to 105°C during a pertinent time (for example, 2 second). The thus sterilized creatine drink is sealed into a 100 to 150 cm^3-volume bottle or can to obtain a final product. The sterilized creatine drink may be charged into a capsule. A prescribed creatine content of 100 cm^3 preparations or 150 cm^3 preparations is in the range of from 1 to 3 gram and of from 1.5 to 4.5 gram, respectively. Sterilization by heating is accompanied by partial decomposition or denaturation of the ingredient and is not therefore rec-

ommended.

[0017] As described above, the process for producing a creatine bevearage according to the present invention makes it possible to preserve and supply creatine, which dissipates muscular fatigue and helps continuation of exercise, in the form of a stable beverage. The creatine content per container being controlled in agreement with the possible upper limit of absorption per intake, the preparation involves no waste and can be offered at reduced cost. Further, it is possible to further increase the effect of the creatine by taking advantage of various additives added thereto.

Table 1

Example	Creatine (mg/dl)	Creatinine (mg/dl)
1	430.0	221.0
2	490.0	280.0
3	730.0	73.8
4	690.0	66.3
5	890.0	23.9
6	940.0	26.1
6'	940.0	60.1

[0018] The above table 1 shows the effects of the present invention. That is, example 1 is a solution in which the creatine 2 gram and tartaric acid ($C_4H_6O_6$) 1 gram are dissolved in water 200 cm^3 and then the dissolved liquid is warmed up. Example 2 is a solution in which the creatine 2 gram and the tartaric acid ($C_4H_6O_6$) 2 gram are dissolved in water 200 cm^3 and the dissolved liquid is warmed up. As a result of the chemical analysis of the examples 1 and 2, it is clear that the creatine is weak to the acid and is easily changed into the creatinine. Examples 3 and 4 are respectively solutions in which the creatine 2 gram is dissolved in water 200 cm^3 and then the dissolved liquid is warmed up. This result also shows that the creatine is not stable and is easily changed into the creatinine. On the other hand, examples 5 and 6 are solution in which the creatine 2 gram is dissolved in water 200 cm^3 at regulated pH 8.9 state and then the dissolved liquid is warmed up according to the present invention. As a result of the chemical analysis of the examples 5 and 6, it is clear that the conversion of the creatine into the creatinine is restrained. Further, example 6' is solution of the example 6 which is let alone for two months at a room temperature.

Claims

1. A creatine beverage which is obtainable by the steps of:
   - heating water rendered weakly alkaline;
   - adding from 1 to 3 gram per 100 cm^3 of the heated water, of crystalline creatine powder to the heated water;
   - dissolving the creatine powder by stirring to form a creatine aqueous solution; and
   - adding an additive for improving nutrition or palatability to the creatine aqueous solution to obtain a creatine drink through a sterilization treatment.

2. A creatine beverage as claimed in claim 1, wherein said creatine drink is filled in a capsule.

3. A creatine beverage as claimed in claim 1, wherein said creatine drink is canned in a can.

4. A creatine beverage as claimed in claim 1, wherein said creatine drink is bottled in a bottle.

5. A process for producing a creatine beverage comprising the steps of:
   - heating water rendered weakly alkaline;
   - adding from 1 to 3 gram per 100 cm^3 of the heated water, of crystalline creatine powder to the heated water;
   - dissolving the creatine powder by stirring to form a creatine aqueous solution; and
   - adding an additive for improving nutrition or palatability to the creatine aqueous solution to obtain a creatine beverage through sterilization treatment.

6. A process for producing a creatine beverage as claimed in claim 5, wherein said water rendered weakly alkaline is heated at pH 7 to 10 to a temperature of from 20 to 99°C.

7. A process for producing a creatine beverage as claimed in claim 5, wherein said additive contains at least one of fruit sugars, amino acids, calcium, magnesium and vitamines.

8. A process for producing a creatine beverage as claimed in claim 5, wherein said sterilization treatment is performed by heating the creatine aqueous solution at a temperature of 60 to 105°C.

9. A process for producing a creatine beverage as claimed in claim 5, wherein said sterilization treatment is performed by using a bacterial filter having an opening of 0.2 μm diameter or less.

10. A process for producing a creatine beverage as claimed in claim 5, further including the step of charging said creatine drink in a capsule, a can or a bottle.

Patentansprüche

1. Ein kreatinenthaltendes Getränk, das durch die Schritte erhältlich ist:

   - Erhitzen von Wasser, das schwach alkalisch gemacht worden ist;
   - Zugeben von 1 bis 3 Gramm, pro 100 cm^3 des erhitzten Wassers, von kristallinem Kreatinpulver zum erhitzten Wasser;
   - Auflösen des Kreatinpulvers durch Rühren, um eine wäßrige Kreatinlösung zu bilden; und
   - Zugeben eines Zusatzstoffes zur Verbesserung des Nährwertes oder der Schmackhaftigkeit zur wäßrigen Kreatinlösung, um ein kreatinenthaltendes Getränk durch eine Sterilisationsbehandlung zu erhalten.

2. Ein kreatinenthaltendes Getränk nach Anspruch 1, wobei besagtes kreatinenthaltendes Getränk: in einer Kapsel abgefüllt ist.

3. Ein kreatinenthaltendes Getränk nach Anspruch 1, wobei besagtes kreatinenthaltendes Getränk in einer Dose abgefüllt ist.

4. Ein kreatinenthaltendes Getränk nach Anspruch 1, wobei besagtes kreatinenthaltendes Getränk in einer Flasche abgefüllt ist.

5. Ein Verfahren zur Herstellung eines kreatinenthaltenden Getränkes, das die Schritte umfaßt:

   - Erhitzen von Wasser, das schwach alkalisch gemacht worden ist;
   - Zugeben von 1 bis 3 Gramm, pro 100 cm^3 des erhitzten Wassers, von kristallinem Kreatinpulver zum erhitzten Wasser;
   - Auflösen des Kreatinpulvers durch Rühren, um eine wäßrige Kreatinlösung zu bilden; und
   - Zugeben eines Zusatzstoffes zur Verbesserung des Nährwertes oder der Schmackhaftigkeit zur wäßrigen Kreatinlösung, um ein kreatinenthaltendes Getränk durch eine Sterilisationsbehandlung zu erhalten.

6. Ein Verfahren zur Herstellung eines kreatinenthaltenden Getränkes nach Anspruch 5, wobei besagtes Wasser, das schwach alkalisch gemacht worden ist, bei pH 7 bis 10 auf eine Temperatur von 20 bis 99 °C erhitzt wird.

7. Ein Verfahren zur Herstellung eines kreatinenthaltenden Getränkes nach Anspruch 5, wobei besagter Zusatzstoff wenigstens einen Stoff aus der Gruppe enthält: Fruchtzucker, Aminosäuren, Calcium, Magnesium und Vitamine.

8. Ein Verfahren zur Herstellung eines kreatinenthaltenden Getränkes nach Anspruch 5, wobei besagte Sterilisationsbehandlung durch Erhitzen der wäßrigen Kreatinlösung bei einer Temperatur von 60 bis 105 °C durchgeführt wird.

9. Ein Verfahren zur Herstellung eines kreatinenthaltenden Getränkes nach Anspruch 5, wobei besagte Sterilisationsbehandlung durch Verwendung eines Bakterienfilters mit einer Öffnung von 0,2 µm Durchmesser oder weniger durchgeführt wird.

10. Ein Verfahren zur Herstellung eines kreatinenthaltenden Getränkes nach Anspruch 5, welches weiter den Schritt umfaßt, daß besagtes kreatinenthaltendes Getränk in einer Kapsel, einer Dose oder einer Flasche abgefüllt wird.

Revendications

1. Boisson à base de créatine obtenue par les étapes consistant à :

   - chauffer de l'eau qui a été rendue faiblement alcaline;
   - ajouter à l'eau chauffée de 1 à 3 g, pour 100 cm^3 d'eau chauffée, d'une poudre de créatine cristalline;
   - dissoudre la poudre de créatine en agitant pour former une solution aqueuse de créatine; et
   - ajouter à la solution aqueuse de créatine un additif, pour améliorer les propriétés nutritives ou gustatives, de façon à obtenir une boisson à base de créatine, en passant par un traitement de stérilisation.

2. Boisson à base de créatine selon la revendication 1, dans laquelle ladite boisson à base de crétine est encapsulée.

3. Boisson à base de créatine selon la revendication 1, dans laquelle la boisson à base de créatine est mise en boîtes de conserve.

4. Boisson à base de créatine selon la revendication 1, dans laquelle ladite boisson à base de créatine est embouteillée.

5. Procédé de production d'une boisson à base de créatine comprenant les étapes consistant à :

   - chauffer de l'eau rendue faiblement alcaline;

- ajouter à l'eau chauffée de 1 à 3 g de poudre de créatine cristalline pour 100 cm^3 d'eau chauffée;
- dissoudre la poudre de créatine par agitation pour former une solution aqueuse de créatine; et
- ajouter à la solution aqueuse de créatine un additif pour améliorer les propriétés nutritives ou gustatives, de façon à obtenir une boisson à base de créatine, en passant par un traitement de stérilisation.

6. Procédé de production d'une boisson à base de créatine selon la revendication 5, dans lequel ladite eau rendue faiblement alcaline est chauffée sous un pH de 7 à 10 à une température comprise entre 20 et 99°C.

7. Procédé de production d'une boisson à base de créatine selon la revendication 5, dans lequel ledit additif contient au moins l'un de composants suivants : sucres de fruit, acides aminés, calcium, magnésium et vitamines.

8. Procédé de production d'une boisson à base de créatine selon la revendication 5, dans lequel ledit traitement de stérilisation est effectué en chauffant la solution aqueuse de créatine à une température comprise entre 60 et 105°C.

9. Procédé de production d'une boisson à base de créatine selon la revendication 5, dans lequel ledit traitement de stérilisation est effectué en utilisant un filtre bactérien présentant une ouverture de 0,2 µm de diamètre ou inférieur.

10. Procédé de production d'une boisson à base de créatine selon la revendication 5, comprenant en outre l'étape consistant à charger ladite boisson de créatine dans une capsule, une boîte de conserve ou une bouteille.